SSE/EFI Working Paper Series in Economics and Finance No 540 October, 2003

Commercial Note Issuing Banks and Capital Market Development: An Empirical Test of the Enskilda Banks' Assets, Liabilities and Reserves in Relation to Evolving Capital Market Liquidity in Sweden, 1834 – 1913

Anders Ögren*

Keywords: *Banking Fragility, Capital Market Development, Classical Silver and Gold Standards, Fractional Reserves, Free Banking, Liquidity*

ABSTRACT

First established during the 1830's, the Enskilda banks were characterized by unlimited owner liability and the right to issue bank notes. Consequently, in Swedish banking history, these banks have been considered to be primitive relics. This paper utilizes new data to revise this picture of the Enskilda banks. Applying Douglas W. Diamond's model (1997) of the cumulative contribution of banks to the creation of liquid asset markets in developing economies to the capital poor country of Sweden, indicates that the Enskilda banks made a contribution out of the reach of non-note issuing banks. In view of the crucial role of the Enskilda banks, the Banking Act of 1864, which effectively permitted the free establishment of such banks, must be judged to have been the most important institutional change facilitating the development of the Swedish credit market.

JEL: E40; G21; N13; N23

I would like to thank all the participants at the EHES Summer School in August 2001, and in particular my commentator Timothy J Hatton for his suggestions. I would also like to thank to Tommy Bengtsson, Torbjörn Engdahl, Hilda Hellgren, Kent Johansson, Mats Larsson, Håkan Lindgren, Håkan Lobell, Douglas Lundin, Lawrence H Officer, Lars G Sandberg, Krim Talia, Daniel Waldenström and the participants at the EHF seminar at SSE in November 2001. All errors are my own. I am grateful for financial support from the Swedish Research Council.

* Stockholm School of Economics. Institute for Research in Economic History. Department of Economics. P.O. Box 6501. SE – 11383. Stockholm. Sweden. E-mail: Anders.Ogren@hhs.se

List of Contents

Figures

Introduction

The fact that the nineteenth century Swedish commercial banking system came to consist of note issuing private banks, the so called Enskilda banks, was not a matter of chance. Contemporary observers often noted that Sweden lacked both capital and means of payment. Sweden being a poor country, and starting in 1834 being committed to a specie standard, there was no wide spread circulation of means of payment. Today it is possible to view the early and extensive use of bank notes, private promissary notes and other IOUs in daily transactions as a sign of financial sophistication. In nineteenth century Sweden, it was considered to be symbolic of Swedish economic backwardness.[1]

[1] The Riksbank's right to issue one SEK notes was revoked in 1878 in order to promote a more "civilized usage of coins". The Standing Committee on Banking opined that the one SEK notes were a remnant of a disorganized monetary system and caused the public to believe that notes were actually coins (BaU 1879 No8 p. 3).

The use of paper and credit money was a result of economic and institutional circumstances that prevented Swedes from settling their transactions with specie coins.

The right to issue notes had been implemented as a way to finance the banks due to the lack of trustworthy means of payment and credit.[2] Consequently, the right to issue notes was seen by contemporaneous actors as a necessary prerequisite for the operation of a bank.

This nineteenth century banking system has in retrospect been evaluated from an evolutionary perspective. The presumed ”answer” to how an efficient commercial banking system should be designed was in terms of the modern system of non-note issuing Joint Stock banks, not private note issuing banks.[3] Thus, instead of realizing that the actors of the time had tried to solve their problems in the best way open to them given the circumstances, the Enskilda banks were simply condemned as symbolic of Sweden’s primitive banking system.[4] This question of the supposed backwardness of the Enskilda banks has also been addressed by international scholars.

In 1978 Lars G. Sandberg published his article, ”Banking and Economic Growth in Sweden Before World War I”. Sandberg argued that the explanation of Swedish economic success, to a considerable extent, could be found in the early development of a sophisticated banking system. More generally, the relatively high level of education that had been achieved despite low income levels, permitted the development of a banking system well suited to the demands of a growing, credit based, economy. Indeed, the relative sophistication of the banking system, was a major pillar supporting Swedish industrialization.[5]

Rejecting Sandberg’s argument, Charles P. Kindleberger questioned whether the mid-nineteenth century Swedish banking system truly could be considered ”sophisticated”. Moreover, he expressed doubt as to the importance of the banking system in promoting Swedish economic growth at that time. Kindleberger’s scepticism was largely based on the observation that the Swedish banks participated only modestly

---

[2] See Ögren, A. (2003a) Chapter 2

[3] Apart from the free banking theory, but this makes the anachronistic assumptions of a fully monetized economy and thus is not applicable on the Swedish case (see Ögren, A. (2003c)).

[4] An example of an anachronistic interpretation is the view of Brisman who wrote in the interwar period. A real and thus effective banking system required a central bank holding monopoly on note issuance, defending the fixed exchange rate by altering the discount rate, and commercial banks were to be non note issuing limited liability Joint Stock banks (Brisman, S. (1924), (1931), (1934)).

[5] Sandberg, L.G. (1978) pp. 656-657

in the export activities that generally were taken to be the driving force behind Swedish industrialization.[6]

On the basis of Granger causality analysis, Douglas Fisher and Walter N. Thurman argued that real Swedish economic growth led to the development of the financial sector, rather than vice versa. Nonetheless, they concluded that the decreasing velocity of circulation of means of payment was evidence of an increasingly sophisticated banking system and thus that Sandberg had a point. Although dubious about how modern the Swedish banking system actually was before the 1870's, Fisher and Thurman agreed that the vital breakthrough in Swedish banking came with the legalization of limited liability Joint Stock banks in 1863.[7]

There is disagreement as to exactly when Sweden experienced the birth of modern banking. Because of its emphasis on deposits, some scholars point to the establishment of Stockholms Enskilda Bank in 1856.[8] Others emphasize the repeal of the usury law, with its 6% percent limitation on interest, and the legalization of joint stock banks in 1863.[9] Following in the footsteps of the great guru of Swedish economic history, Eli F. Heckscher, Kindleberger argued that prior to 1895 the history of Swedish banking was largely limited to that of the Riksbank, the central bank owned by Parliament.[10]

Even though the years chosen might differ, the case for Swedish financial backwardness is always the same: the absence of a deposit banking system and of liquid capital markets. The clear implication is that a modern banking system requires *Credit Mobilier* type banks, financed by substantial equity capital and deposits, and with joint stock, limited liability for the owners.

At least during the first half of the nineteenth century, Sweden did indeed lack liquid capital markets. The most important capital markets, naturally enough, were located in the two principal cities, Stockholm and Gothenburg.[11] There are theoretical arguments for the belief that an expanding banking system promotes economic growth. One of these is that banks can convert illiquid assets into liquid liabilities, thus channeling

---

[6] Kindleberger, C.P. (1982) pp. 918-920

[7] Fisher, D. & Thurman, W.N. (1989) pp. 625, 627-631

[8] See Nilsson, G.B. (1981) and Gasslander, O. (1962)

[9] Fisher, D. & Thurman, W.N. (1989) p. 625, Sandberg, L.G. (1978) pp. 657, 663. Sandberg divided the Swedish banking history into an early and a modern period. The latter began in 1864 when joint stock banking was introduced and the usury law was repealed.

[10] Kindleberger, C.P. (1982) pp. 918-919

[11] See Lobell, H. (2000).

capital to activities where demand for it is greatest.[12] Thus, there is reason to believe that a result of an expanding banking system is the creation of more liquid, and hence more efficient, capital markets.[13]

Since limited liability Joint Stock banks are considered to be the trade mark of a modern banking system, the Swedish ”Enskilda” banks, characterized by unlimited owner liability and the right to issue notes, are commonly viewed as banking relics. They were first established in the early 1830's and they retained the right to issue notes until the Banking Act of 1897 conferred a note issuance monopoly on the Riksbank, starting in 1903.[14]

The question if the banking system was “modern” or “sophisticated” or not, might be an anachronistic question based on the view that a banking system has to operate with deposits or equity capital to finance its business. But, if the Swedish banking system was modern or sophisticated is really not the question. The more important question is whether or not the Joint Stock banks truly were more efficient than the Enskilda banks, and if greater reliance on the former would have been better for Swedish economic development. This chapter concludes that such would not have been the case.

This chapter uses balance sheet data of the Enskilda banks’ assets and liabilities at the end of each year from 1834 until 1900 in order to analyze developments over time.[15] The results suggest that the system of Enskilda banks might well have been optimal, given the institutional setting of the nineteenth century. The introduction of joint stock banking and the repeal of the usury law were not the most important institutional changes behind the development of the Swedish credit market. The Act of 1864, essentially permitting the free establishment of Enskilda banks and the automatic renewal of their charters, played a greater role. The note issue of the Enskilda banks

---

[12] See Diamond, D.W. & Dybvig, P.H. (1983) and Diamond, D.W. & Rajan, R.G. (2001).

[13] Diamond, D.W. (1997) pp. 949-950

[14] For a survey of the Enskilda banks during the period 1834 – 1913, see Ögren, A (2000). Lars Jonung has argued the case of the Enskilda banks from a strict free banking perspective, see Jonung, L. (1989).

[15] These were published in *Post & Inrikes Tidning* for the years 1834 -1870 and in *Sammandrag af Bankernas Uppgifter* for 1871-1906. The years 1835-1846 and 1867-1870 have been supplemented with data from Sveriges Riksbank (1931) pp. 172-179. For 1866, balance sheets as of the end September, rather than the end of December, have been used. These balance sheets are the only source that include detailed information of the Enskilda banks’ assets and liabilities for the entire period. The accuracy and reliability of the figures reported by the banks might be questioned. When other sources differ from them, however, other sources than balance sheets are more favorable for the Enskilda banks in terms of the size of reserves (see BaU 1853/54, Brisman, S. (1924) pp. 246-247, Finanskommittén 1858 and Sveriges Riksbank (1931) pp. 172-179). After the year 1900 Enskilda bank notes in circulation demised

contributed substantially to the creation of liquid financial markets and, ironically, perhaps to creating the conditions needed for deposit based banking.

Enskilda Banks versus Joint stock banks

As noted in the introduction, a previous study of the causal relationship between the money supply (M2) and real GDP growth in Sweden during the period 1861-1913 concluded that the financial system did not lead growth. On the contrary, it concluded that real economic growth resulted in expanding financial markets.[16]

Nonetheless, the puzzling question as to the relationship between financial and real economic growth remains unresolved. Of course, most wealthy countries have well developed financial sectors. Moreover, research indicates that innovative financial systems are important for economic growth.[17] Thus, there unquestionably is a link between overall economic performance and the quality of the financial system. This, in turn, implies that the development of the commercial banking system was of importance for the growth of the real economy. It thus can be argued that, within the existing institutional setting, Sweden had an efficient banking system.

If limited liability joint stock banks truly were superior to Enskilda banks, the post 1863 period should have witnessed a decrease in the number of Enskilda banks in operation and a rapid expansion of joint stock banking. In fact, however, even after joint stock banking was legalized and interest rate ceilings were abolished, Enskilda banks continued to be established. Since the Enskilda banks imposed unlimited liability on their owners, the question becomes why would anyone accept a greater personal risk in order to found an already outdated bank?

The Establishment of New Banks

During the years 1864 through 1867, no less than fourteen new Enskilda banks were established, thus demonstrating that this form of banking hardly could have been

---

drastically as a response to the coming ending in 1903. Due to the emphasis on the note issuance in this chapter, this year is chosen as the ending year.

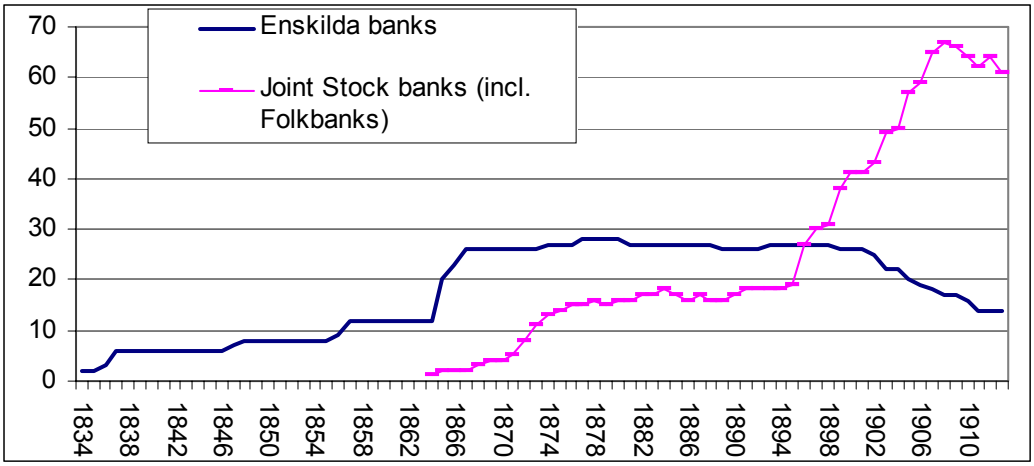
[16] Fisher, D. & Thurman, W.N. (1989) pp. 627-629. Sandberg and Kindleberger, as well as Fisher and Thurman, all adhere to the Coase theorem: that is that financial systems develop in response to demand (see also Sandberg, L.G. (1982) pp. 921-922).

[17] See Sandberg, L.G. (1978), Petersson, T. (2001) and Sylla, R. (2002). In a recent study on Sweden 1834 – 1991, Hansson and Jonung found evidence for a relation between real economic growth and the financial sector. Their interpretation of the causality was that the financial system preceded real economic growth (Hansson, P. & Jonung, L. (2000) pp. 228-230).

obsolete.[18] A single joint stock bank, the *Skandinaviska Kreditaktiebolag* was established in 1864 in Gothenburg, and it did in fact rapidly assume an important position on the Swedish credit market. Previous to the second wave of joint stock bank establishments during the late 1890's, however, the only joint stock banks that can be considered to be commercial banks were established in Stockholm and Gothenburg, where capital markets already existed.

The joint stock banks that appeared outside these two cities were small, so-called *folkbanks*. These were more akin to regional savings than to commercial banks. It was only during the late 1890's, when a plethora of new banks were established, that the Enskilda banks ceased to be the primary form of bank. The reason behind this change, however, was institutional rather than strictly economic. A previously anticipated act rescinding the Enskilda banks' right to issue notes was enacted by Parliament in 1897.[19] The increase in the number of joint stock banks was also accelerated by legislation constraining savings bank behavior passed in 1892. Consequently some savings banks were converted into (joint stock) *folkbanks*.[20]

Figure 1: No of Enskilda and Joint Stock Banks (including folkbanks), 1834-1913.



Sources: Post & Inrikes Tidning 1835-1871, Sammandrag af Bankernas Uppgifter, 1871-1911, Sveriges Riksbank (1931) pp.172-185

One piece of evidence used, first by Flux and later by Kindleberger, to argue that the Enskilda banks were not a successful form of banking is the small number of such

[18] Indeed, the last Enskilda bank was not established until 1893. It was located in Norrbotten, in the far north of Sweden where business still was suffering from a scarcity of capital.

[19] Jonung, L. (1989) p. 38, Ögren, A. (2000) p. 50

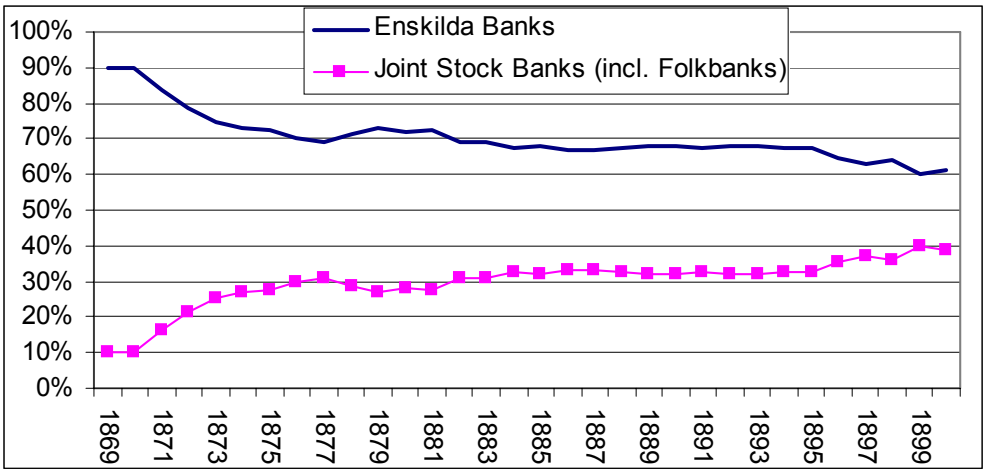
[20] Sjölander, A. (2000) p. 44

banks established before the mid 1860's. This is taken as a sign that the demand for Enskilda bank credits was low.[21]

The true reason for the small number of new banks, however, was institutional in nature. The Crown and influential groups in the Parliament had more to gain from preventing a massive establishment of banks. Previous to 1864, the Enskilda banks were required to obtain royal charters that were limited to ten years duration. At the end of that time, the bank had to close its operations and reapply. This procedure prevented the large scale establishment of Enskilda banks. Not surprisingly, large groups within Parliament came to dislike Enskilda banks and acted to inhibit the establishment of such additional Enskilda banks. It also explains why the Banking Act of 1864, which granted virtually total freedom to establish Enskilda banks, was so important.[22]

Many of the Enskilda banks that were established during the late 1860's were former so-called ”filial banks”. These were a form of limited liability bank operating on the basis of credits from the Riksbank. When this form of banking was ended in 1862, virtually all of these filial banks were converted into Enskilda, not joint stock, banks. As shown in Figure 3.2, throughout the nineteenth century the Enskilda banks as a group had more assets than did the joint stock banks. [23]

Figure 2: Enskilda and Joint Stock Banks Assets, 1869 – 1900 (percentage shares of total commercial bank assets).



Sources: Post & Inrikes Tidning 1870-1871, Sammandrag af Bankernas Uppgifter, 1871-1900, Sveriges Riksbank (1931) pp. 172-185

[21] Flux, A.W. (1910) p. 56, Kindleberger, C.P. (1982) p. 920

[22] See Ögren, A. (2003a) Chapter 2.

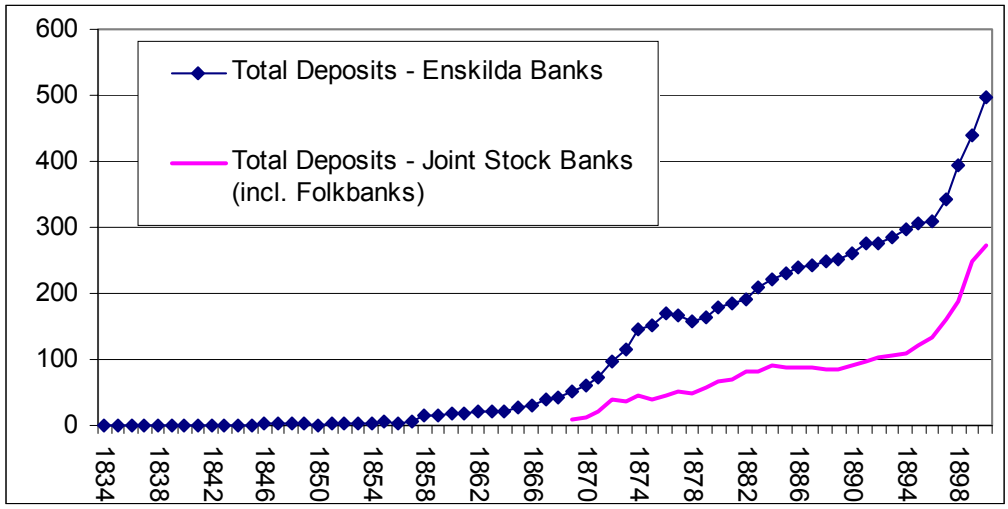
[23] When Parliament initiated these banks, the hope was that they would facilitate the replacement of Enskilda bank with Riksbank notes. Instead, the filial banks became major distributors of Enskilda bank notes, see Ögren, A. (2003a) Chapter 2.

Since commercial banking in general promoted the growth of the real economy, it can be concluded that this also was the case with the Enskilda banks. There clearly is little evidence to support the notion that the Enskilda banks were obsolete by the 1870's.

Bank Deposit Financing

If reliance on deposit financing is a measure of bank modernity, then the Enskilda banks once again pass the test. By 1867, deposits exceeded notes as a source of Enskilda bank financing.[24] Indeed, Enskilda banks had accepted deposits right from their inception, although these were originally less import than notes. As demonstrated in Figure 3, until the turn of the twentieth century total Enskilda bank deposits considerably exceeded those of the joint stock banks.

Figure 3: Total Deposits in Enskilda and Joint Stock Banks, 1834 – 1900 (1,000,000's SEK)



Sources: Post & Inrikes Tidning 1835-1871, Sammandrag af Bankernas Uppgifter, 1871-1900, Sveriges Riksbank (1931) pp. 172-185

The low reliance on deposits during the first half of the nineteenth century had its roots in the modest circulation of means of payment that could be accepted as deposits which, in turn, increased the importance of the Enskilda bank notes. By initially financing their activities mainly with notes, the Enskilda banks helped create the conditions making the utilization of deposits possible.

The 6% legal limit on interest rates has been perceived to be the true obstacle to the development of a banking system dependent on, or at least willing to utilize, deposits as a source of funds. Another factor limiting the banks' ability to attract deposits surely

[24] Ögren, A. (2000) pp. 87-88

must have been the scarcity of official means of payment. Deposits could only become a viable alternative source of funds for banks if means of payment more official than private promissary notes were in circulation. The Enskilda banks' creation of semi-official means of payment arguably was more important for the development of a deposit financed banking system than was the repeal of the usury law.[25]

As early as 1859, the volume of Enskilda bank notes in circulation exceeded that of Riksbank notes, a situation that continued throughout the rest of the nineteenth century. In 1869, the Riksbank was compelled to accept Enskilda bank notes for deposit at par. While the share of notes in total Enskilda bank liabilities decreased, the absolute volume of notes in circulation continued to increase and peaked in 1900.[26] There is no doubt that the Enskilda banks performed an important service before the 1870's by supplying good quality means of payment. The question is, were they outdated after the 1870's?

Enskilda Banks and the Liquidity of the Swedish Capital Markets

The study of Swedish monetization has one major omission: the regional variation in liquidity.[27] There is good reason to believe that while the major cities were reasonably well supplied with credit and means of payment, peripheral areas still suffered from a shortage of capital during the 1870's. In this paper it is argued that reliance on deposits varied geographically. A bank situated in Gothenburg or Stockholm, cities with their own capital markets, had greater opportunities to attract deposits than did rural banks. Thus, after 1863, the motive for opening a note issuing bank might be expected to be the supplying of credit to an area where deposits alone would not do the trick.

A cross section study of the Enskilda banks existing in 1871 supports the hypothesis that the geographical distance to the principal capital markets affected the ability to utilize deposits negatively. Each bank's deposits as a percentage of total liabilities (DEPOSITS) served as the dependent variable. The sum of the distance in kilometers to Stockholm and Gothenburg (STHLM+GBG) was used as a proxy for the degree of the bank's peripheral location relative to the major liquid capital markets. A dummy variable (EST60), was included to determine if there was any significant relationship

[25] See Ögren, A. (2003c)
[26] See Ögren, A. (2003c) and Ögren, A. (2000) pp. 45-47
[27] The overall monetization of Sweden is studied in Ögren, A. (2003c)

between the bank's reliance on deposits and how long it had been in business (se Appendix A for model test results).

Figure 4: Cross Sectional OLS-Regression on Geographical Distance and Bank Establishments as Determinants on the use of Deposits in 1871.

Dependent Variable: LOG(DEPOSITS)				
Sample(adjusted): 2 27				
Included observations: 26 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.443573	0.990213	1.457841	0.1584
LOG(STHLM+GBG)	-0.387038	0.156215	-2.477599	0.0210*
EST60	-0.064223	0.104264	-0.615966	0.5440
R-squared	0.260449	Mean dependent var		-1.078272
Adjusted R-squared	0.196140	S.D. dependent var		0.282722
Log likelihood	0.385317	F-statistic		4.049968
Durbin-Watson stat	1.578089	Prob(F-statistic)		0.031127

* Denotes significance at least at 5%

Sources: Sammandrag af Bankernas Uppgifter 1871, Motormännens Riksförbund (1999)

The OLS-regressions indicates a negative relationship between deposits as a percentage of total assets and a bank's distance from liquid capital markets. Whether or not the bank was of recent origin (post 1864), however, did not significantly affect its reliance on deposits.

Figure 5: Issued Notes, Deposits and Bond Holdings, as Percentages of Total Assets in 1871 and 1881 for Enskilda Banks Established Between 1865 and 1871, Arranged by Note Issuance in 1871.

Bank	**Notes-1871**	**Notes-1881**	**Deposits-1871**	**Deposits-1881**	**Bonds-1871**	**Bonds-1881**	**Region**
HernösandsEB	42%	24%	24%	44%	1%	5%	North
SundsvEB	38%	18%	31%	51%	0%	3%	North
WesterbEB	35%	20%	21%	46%	0%	4%	North
GeflebLEB	32%	17%	39%	57%	3%	5%	North
SkarabLEB	31%	13%	44%	56%	0%	3%	West
ChristianstEB	30%	19%	38%	48%	2%	7%	West
CalmarEB	29%	13%	26%	50%	5%	13%	South
Ebi Christineh	28%	15%	23%	37%	0%	5%	West
UplandsEB	27%	13%	52%	63%	18%	21%	East
EB i Wernersb	26%	16%	37%	41%	3%	4%	West
GotlEB	25%	13%	24%	49%	0%	4%	South
SödermanlEB	23%	17%	44%	55%	8%	10%	East
BohusLEB	21%	16%	23%	47%	0%	5%	West
BoråsEB	16%	10%	41%	57%	1%	4%	West
All Enskilda banks	27%	16%	39%	53%	7%	9%	

Source: Sammandrag af Bankernas Uppgifter 1871, 1881

Figure 5, however, indicates that several Enskilda banks were established in close proximity to Stockholm and Gothenburg. Thus, although the right to raise funds through note issuance was most important in peripheral areas of Sweden, such as the northern parts, it was utilized to some extent by all banks.

Deposit financing differed more among banks in various regions than did note issuance, but the banks closest to Stockholm and Gothenburg had the most deposits. The relative importance of notes diminished for all banks between 1871 and 1881, as increased overall liquidity permitted an increase in deposits. In absolute amounts, however, notes outstanding continued to increase for all banks.

An additional measure of local market liquidity is the quantity of bonds held by the banks, since the willingness to hold them ought to increase with the availability of a liquid secondary market. The fact that the peripheral banks held less bonds, both in 1871 and in 1881, is evidence of the geographically unequal spread of liquidity. Overall, the increase in total bond holdings during this decade is evidence of growing liquidity throughout the Country.

Since Enskilda banks were established even in areas where capital scarcity does not seem to have been an acute problem, the question must be asked why the joint stock form of organization was not used? Three reasons for establishing Enskilda banks in the more central areas can be posited: 1) The unlimited liability of Enskilda bank owners might have increased public confidence, thus making it possible for them to be less heavily capitalized, 2) The choice of the Enskilda bank format might have been a matter of path dependence, or 3) Even if capital scarcity in the region was not an acute problem, the ability to issue notes might have been of initial importance to the new bank. That is, the issuing notes might have allowed the bank to consolidate its finances and expand its business faster than otherwise would have been the case.

Furthermore, since the Enskilda banks did not exhaust their issuance quotas, they, unlike the joint stock banks, could instantly relieve a temporary lack of liquidity by issuing notes. This fact might explain the willingness of owners to accept the greater risks of unlimited liability. If the banks promoted economic growth by turning real assets into liquid credit, then the question becomes: did the development of the Enskilda banks contribute to the creation of liquid capital markets in Sweden?

Enskilda banks, Liquid Reserves and the Emergence of Liquid Capital Markets

Above, it was argued that banks make an important contribution to economic growth by converting illiquid assets into liquid liabilities. Doing so, however, exposes banks to the danger of runs, in turn forcing them to hold non-interest bearing liquid assets to be able to meet the demands of depositors and note holders. The more instantly redeemable liabilities a bank has, the more vulnerable it is to runs, and therefore the more liquid assets it needs to meet possible liquidity shocks. While more liquid assets reduces the likelihood of bank failure, however, it also impedes credit creation and, thus, economic growth.[28] In brief, the level of liquid reserves reflects a trade off between the risk of bank failure and the demand for credit.

The trust engendered by a banking system, as well as its efficiency, might be measured in terms of the evolution of its liquid reserves. The level of the banks' liquid reserves are an indicator of the public's fear of bank failures. The less reserves the banks have to hold, the more efficient they can be in promoting economic growth. The level of reserves is also related to the state of secondary asset markets. The more liquid these are, the more the banks can substitute interest bearing, for non-interest bearing, financial assets, thus further increasing capital market liquidity. The principal goal of this chapter thus is to analyze the factors that determined the level of liquid reserves maintained by the Enskilda banks during the period 1834 - 1900.

In order to allow holders of their notes to redeem these in legal tender, the Enskilda banks were forced to hold cash reserves. Assuming that the banks behaved efficiently, they would not hold excessive cash reserves. According to free banking theory, the demand for cash reserves by a bank's customers has to be satisfied.[29] Thus, legal limitations on the right to issue notes only provided a framework for the banks' choices of reserves. Since the Enskilda banks issued less than their legally permissible quantity of notes, their effective issue was not limited by rules and regulations, rather it was limited by the public's demand that they hold sufficient legal tender.[30] The Enskilda banks regularly published their balance sheets, providing a high level of transparency of their situation.

---

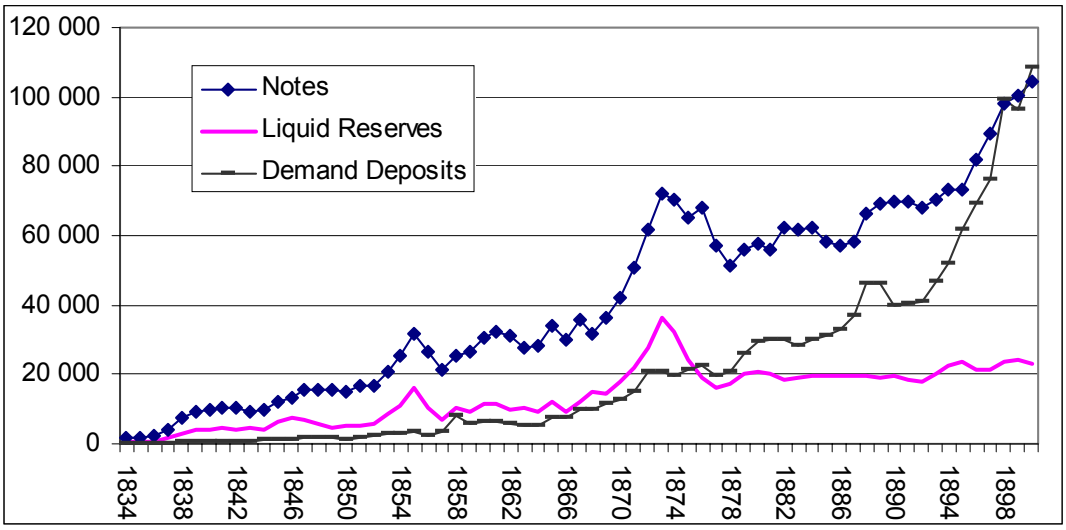
[28] See Diamond, D.W. & Dybvig, P.H. (1983) and Daimond, D.W. & Rajan, R.G. (2001). Diamond and Rajan also discuss the benefits of banking fragility for economic growth (Daimond, D.W. & Rajan, R.G. (2001) pp. 287-288).

[29] Selgin, G.A. & White, L.H. (1994) p. 1720

[30] Ögren, A (2000) pp. 39-40

The contemporary Swedish debate on banking focused on the question of bank notes. Critics argued that note issuance threatened both the prudence of the banks and, by extension, the fixed exchange rate, even though a run on deposits would be just serious as one on notes.[31] Still, as shown in figure 6, liquid reserves were not as closely linked to demand deposits as to notes in circulation.

Figure 6: Note Issuance, Demand Deposits and Liquid Reserves of the Enskilda banks, 1834 – 1900 (1,000's SEK).

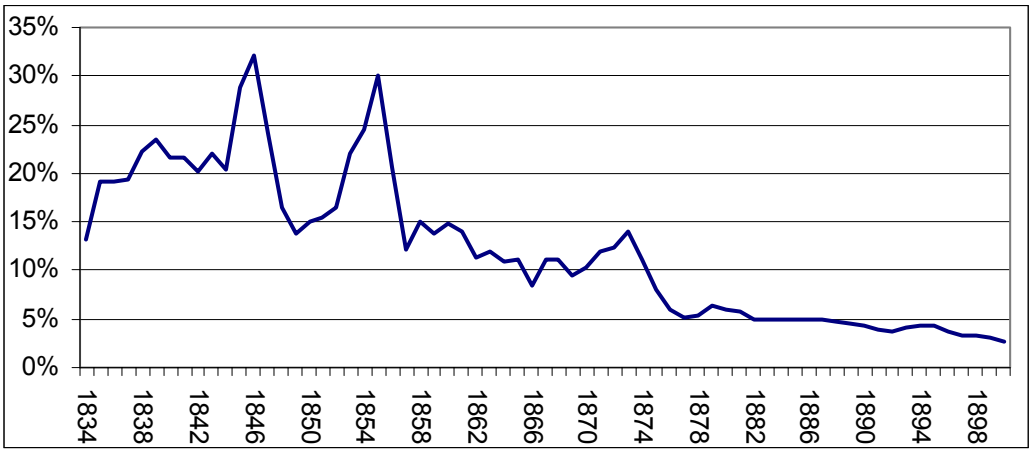


Sources: Post & Inrikes Tidning 1835-1871, Sammandrag af Bankernas Uppgifter 1871-1900

Assuming that the banks were efficient in their choice of liquid reserves, the reserves actually maintained must have been sufficient in the eyes of the public. Either the banks' customers did not consider demand deposits to be a source of bank vulnerability, or else the demand for liquid reserves declined over time while, co-incidentally, demand deposits also increased. The former explanation seems unlikely in view of the fact that Stockholm Enskilda Bank experienced a run on deposits in December of 1878.[32] The latter explanation would imply a general, over all decrease in the demand for cash reserves. As shown in figure 7, the overall level of liquid reserves did indeed decline during the latter part of the period. The question thus becomes why liquid reserves were allowed to shrink to approximately three percent of total assets by the end of the period?

[31] Ögren, A. (2000) p. 47. As an example, in the early 1860's a tax was imposed on the issuance of notes.
[32] Söderlund, E. (1964) pp. 113, 129

Figure 7: Liquid Reserves of the Enskilda Banks as a Percentage of Total Assets, 1834 – 1900.



Sources: Post & Inrikes Tidning 1835-1871, Sammandrag af Bankernas Uppgifter 1871-1900

The dramatic decline in cash reserves shown in figure 7 might be explained by any one (or combination) of three hypothesis: 1) Increasing confidence in the banking system might have decreased the public's demand for liquid reserve, 2) Increasing demand for credit might have made it possible for banks to hold smaller liquid reserve, or 3) Increasing liquidity of the financial market might have it possible for the banks to substitute interest bearing (e.g. bonds, bills of exchange or shares), for non-interest bearing, financial assets. Although not likely, it is also possible that the lower liquid reserves might be the result of an institutional focus on notes. That is, the public was more concerned with the backing of notes than of other liabilities.

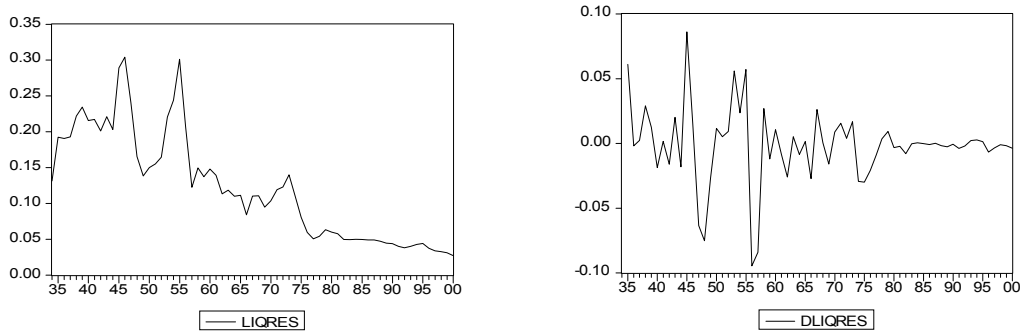
A Bank Specific Model Estimating the Determinants of Liquid Reserves

Before analyzing the structure of assets and liabilities, a qualitative discussion of the relationships among various types of assets and liabilities and of the banks' risk profile is required. The holder of a bank note or a deposit is primarily concerned with his/hers ability to convert the note into legal tender or to withdraw the deposit. Clearly the structure of the bank's assets and liabilities affects this ability.

All the variables are measured relative to total assets (and hence also to liabilities). Thus, the original series reflect the Enskilda banks' holdings of various types of assets and liabilities as percentages of total assets. The series first differences, in turn, reflect annual percentage changes in these assets and liabilities relative to total assets.

The dependent variable LIQRES is defined as the banks' holdings of legal tender (i.e. specie plus Riksbank notes). Notes of other private banks are not included.[33] These liquid reserves measure the bank's ability to instantaneously pay out deposits and to redeem its notes in legal tender.

Figure 8: Liquid Reserves as a Percentage of Total Assets and Annual Changes in that Percentage, 1834 – 1900.



Bank assets can be classified according to their riskiness. This riskiness, of course, was one reason there was a demand for cash reserves. If all assets were risk free and could be traded instantaneously, the need for cash reserves would be close to zero. In other words, the most secure and liquid assets available were legal tender. With regard to the liabilities of the banks, the following four variables are included in the model:

NOTES and DDEP: Notes in circulation and demand deposits were the most critical bank liabilities, being subject to instantaneous redemption or withdrawal.[34] Thus, these two categories of liabilities ought to have played a major role in determining the banks' preparedness to pay out legal tender. Notes and demand deposits, in relation to total assets, are thus expected to be positively correlated to the quantity of liquid reserves.

[33] The small share of any Enskilda bank's notes held by other Enskilda banks indicates both that holding these notes, rather than converting them to legal tender, was considered unnecessarily risky and, in addition, of benefit to the issuing, and competing, bank. Each Enskilda bank thus tried to redeem the notes of all the other Enskilda banks as quickly as possible. These notes, therefore, are not included as assets in the model.

[34] Also included in the category of outstanding notes are other types of bank promissary notes, such as the so-called bank postal bills, introduced in 1857 to facilitate inter bank clearing, even though legally they did not have to be backed by reserves.

Figure 9: Circulating Notes as Percent of Total Assets and Annual Changes in that Percentage, 1834 – 1900

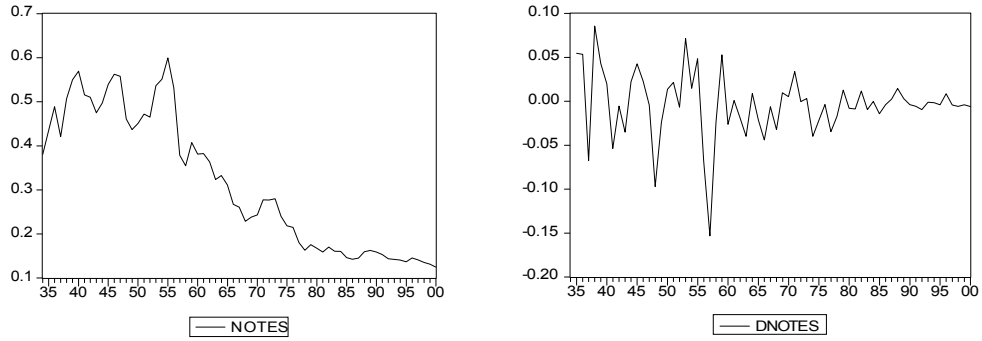
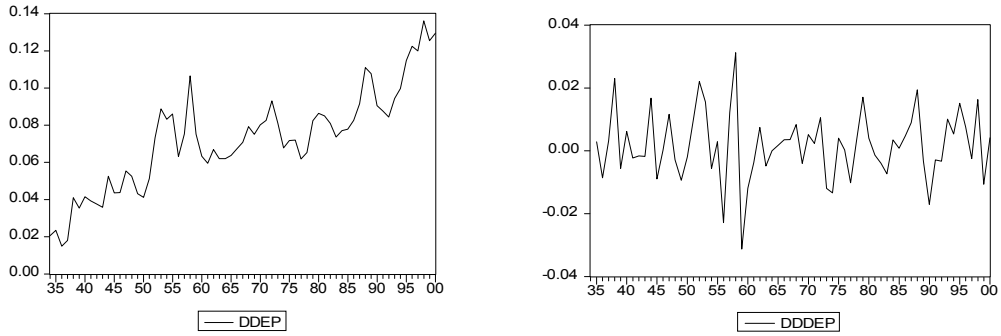
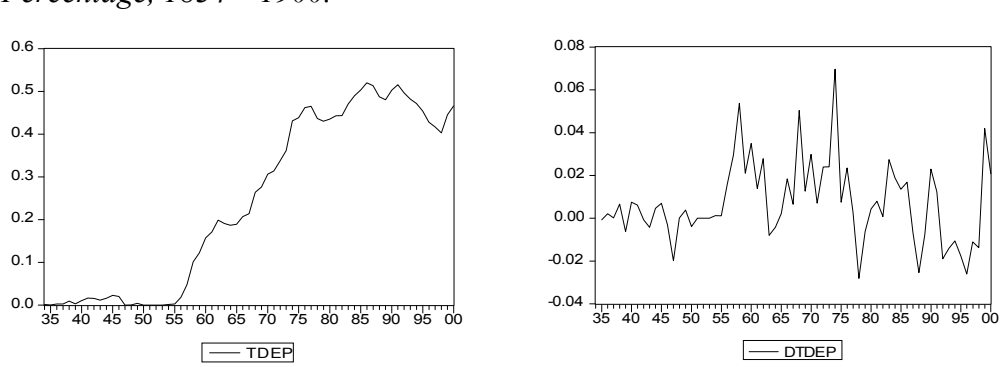


Figure 10: Demand Deposits as Percent of Total Assets and Annual Changes in that Percentage, 1834 – 1900.



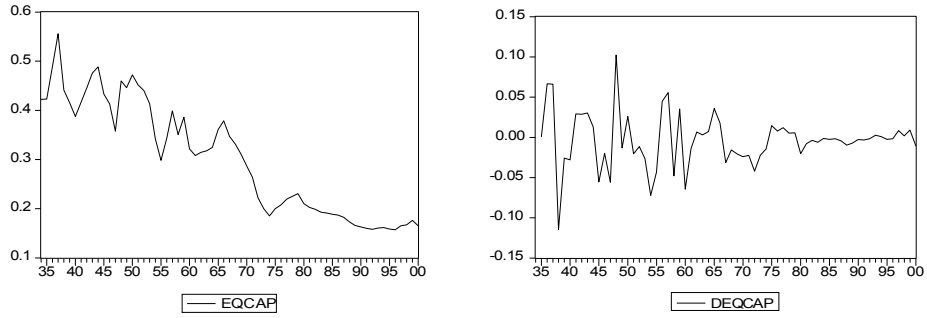
TDEP: Time deposits, which could be withdrawn between two and six months notice, could be expected to require less liquid reserves than notes or demand deposits. A quicker payout, however, would tend to increase public confidence in a bank. Delay could make customers wonder if the bank was operating prudently. Thus, time deposits can also be expected to be positively correlated with cash reserves.

Figure 11: Time Deposits as Percent of Total Assets and Annual Changes in that Percentage, 1834 – 1900.



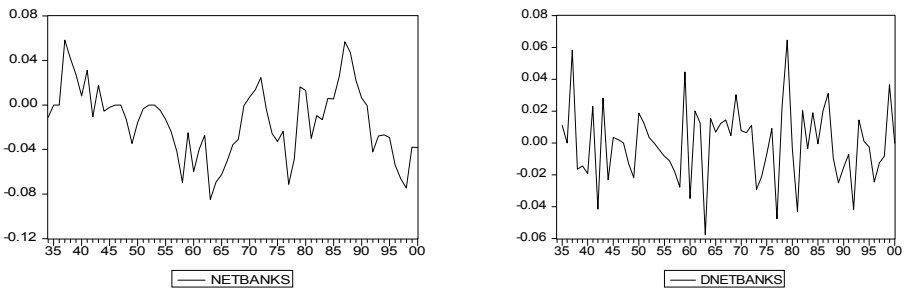
EQCAP: The least risky category of bank liabilities was their equity capital. It appeared on both sides of the balance sheet. On the asset side, the equity capital was divided between the so called security fund (*Grundfondshypotek*), which consisted of bonds and of certain types of stocks and other secure assets and legal tender reserves.[35] The larger the share of equity capital in total assets, the greater the liquid reserves the bank ought to be able to maintain. If the hypothesis that increasing liquidity of capital markets made it possible for the banks to substitute other financial assets for liquid reserves is correct, however, then the growth of equity capital ought to have been negatively related to liquid reserves. That is, banks could hold other financial assets as substitutes for legal tender.

Figure 12: Equity Capital as Percent of Total Assets and Annual Changes in that Percentage, 1834-1900.



NETBANKS: This series consists of assets maintained with other financial institutions minus the debts to the bank of these institutions. An increase in the net value of these assets ought to affect liquid reserves negatively.

Figure 13: Net Assets Maintained at Other Financial Institutions as Percent of Total Assets and Annual Changes in that Percentage, 1834 – 1900

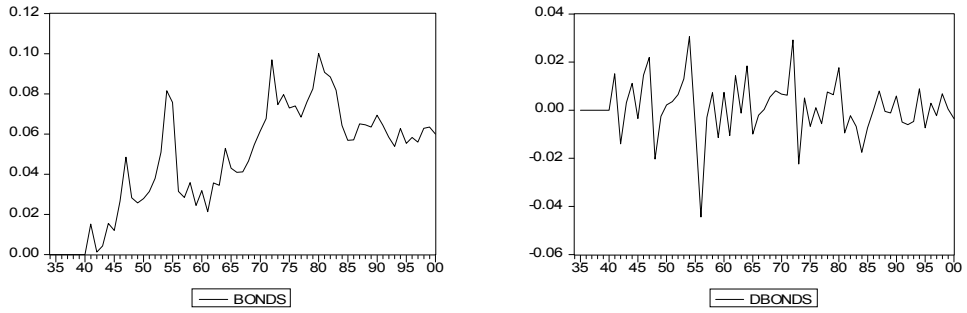


[35] On the asset side there was the so-called security fund. It was that part of the equity capital which consisted of shares and bonds rather than liquid reserves. Since it is strongly correlated with equity capital, it is excluded from the model.

When studying changes in liquid reserves in response to changes in the banks' holdings of other assets, there is already a defined relationship since each class of assets in measured in relation to total assets. Thus, increasing the percentage of one type of asset inevitable requires an offsetting reduction in other assets.[36] Nonetheless, this is the basis for determining any systematic relationship between liquid and other types of assets. For instance, did liquid reserves vary systematically in response to changes in the holdings of bills of exchange, bonds or stocks?

BONDS & BOE: Interest bearing assets, not part of the banks' security funds, such as bonds and bills of exchange, could fluctuate in value.[37] This problem, however, diminished as the liquidity of secondary markets increased. The relationship between liquid assets and bonds and bills of exchange, therefore, is an indication of the liquidity of secondary markets. Holdings of bonds and bills of exchange would be expected to increase relative to liquid reserves as those assets increasingly came to be viewed as reliable substitutes for liquid reserves.

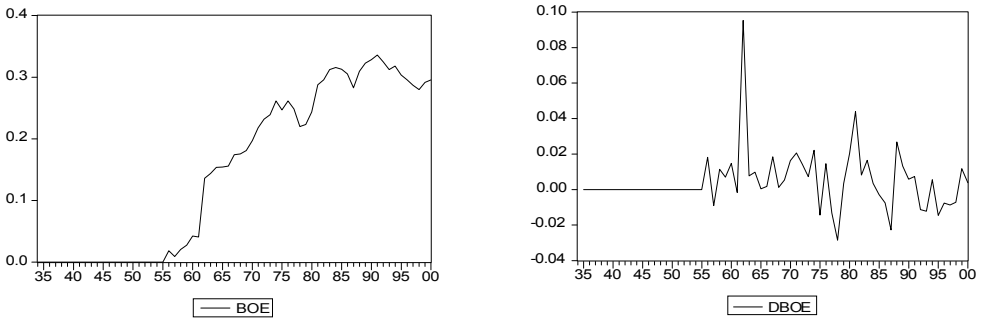
Figure 14: Bonds as Percent of Total Assets and Annual Changes in that Percentage, 1834 – 1900



[36] One potential problem with performing the regression with the variables being measured relative to total assets (and, therefore, also to total liabilities) is that the variables are locked into a defined relationship. As a result the model's goodness of fit value (R2) is extremely high (92%). Still, there are two reasons that this problem probably has not biased the results: 1) The independent variables do not appear to strongly correlated internally (no multicolinearity), and 2) Running an OLS regression with the independent variables limited to the most important types of liabilities, thus dissolving the defined relationship to the dependent variable, did not dramatically alter the results. The most noticeable change was a drop in the value of R2 to a less spectacular, but still impressive, value of 75% (see Appendix B).

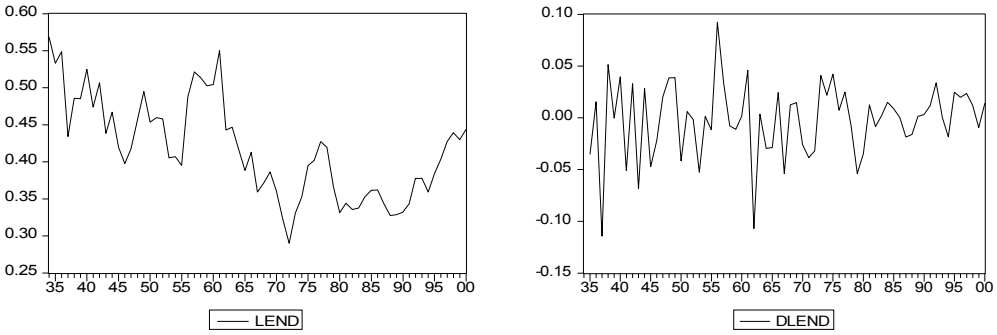
[37] One example was the bonds issued to finance the construction of private railroads in Sweden, which rapidly increased in value during the boom years 1870 - 1874. Between 1875 and 1878, however, they shrank to less than half their nominal value, if any buyer could be found. The crisis of 1878 - 1879 also demonstrates that a lack of liquidity on secondary asset markets in a small transition economy such as nineteenth century Sweden could increase the volatility of asset prices, especially during economic downturns (see Ögren, A. (2003b)).

Figure 15: Bills of Exchange as Percent of Total Assets and Annual Changes in that Percentage, 1834 – 1900



LEND: Loans were one bank asset that could result in higher levels of risk. The larger the share of bank assets that consisted of credits, the harder it was to increase liquidity on short notice. At the same time, the trade off between the public's demand for credit and its demand for liquid reserves is built into this parameter. If the hypothesis that increased demand for credit permitted a shrinkage of liquidity is correct, then the relationship should be negative.

Figure 16: Lending as Percent of Total Assets and Annual Changes in that Percentage, 1834 – 1900



One final question concerns the role of institutional change. The Banking Act of 1864 was important in that it reduced the impediments to new banks caused by charter requirements. It can therefore be seen as a signal of official approval of the Enskilda bank system which, in turn, might have reflected growing public confidence in these banks.[38]

[38] Ögren, A. (2000) pp. 37-38

Estimating the Model for Determining the Enskilda Banks' Liquid Reserves

As noted above, all the variables are measured relative to total bank assets (and thus also to bank liabilities). This makes the model less sensitive to the number of banks, which in fact increased substantially during the period. It also gives a better picture of the trade off between liquid reserves and other types of assets and liabilities faced by the Enskilda banks than would absolute values. All the series used in the model have been converted into first differences. So doing makes it possible to test how changes in the composition of assets and liabilities affected the holdings of liquid reserves in the short run.

One problem is the small number of banks that existed early in the period. This increases the sensitivity of the results to the actions of a single bank. In addition, the growing number of banks changed over all conditions. As can be seen from the graphed data series, several of the series experienced decreased volatility over time, thus making the model likely to suffer from heteroskedasticity (see Appendix B for model test results).

The volatility of the early period (from 1834 until approximately 1857/58) can not be explained simply by the crises of 1846/47 and 1856/58. The strong effect of these crises on liquid reserves is most probably explained by the small number of banks in existence. The eighth Enskilda bank was established in 1848. This number then remained constant until the founding of Stockholm Enskilda Bank in 1856. Since 1848 was the earliest year for which complete balance sheets for all the banks could be located, the estimation of the model begins with that year (see figure 17).

Figure 17: OLS-Regression of the Determinants of the Enskilda Banks' Liquid Reserves

Dependent Variable: D(LIQRES)				
Sample: 1848 1900				
Included observations: 53				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000329	0.001197	-0.274696	0.7848
D(NOTES)	0.374589	0.054964	6.815180	0.0000*
D(DDEP)	0.233642	0.115118	2.029597	0.0485*
D(TDEP)	0.186586	0.070322	2.653305	0.0110*
D(EQCAP)	-0.411678	0.067226	-6.123787	0.0000*
D(NETBANKS)	-0.354857	0.059962	-5.917981	0.0000*
D(BONDS)	-0.654004	0.144980	-4.511005	0.0000*
D(BOE)	-0.703533	0.083705	-8.404890	0.0000*
D(LEND)	-0.569022	0.065145	-8.734735	0.0000*
R-squared	0.929814	Mean dependent var		-0.004021
Adjusted R-squared	0.917052	S.D. dependent var		0.026099
Log likelihood	188.9324	F-statistic		72.86266
Durbin-Watson stat	2.076707	Prob(F-statistic)		0.000000

* Denotes at least 5% significance level

Sources: Post & Inrikes Tidning 1849 – 1871, Sammandrag af Bankernas Uppgifter, 1871-1871-1900, Sveriges Riksbank (1931) pp. 172-185

The most general result of the model, displayed in figure 17, is that changes in each of the independent variables affected, at the 5% significance level, the liquid reserves held by the banks.[39] Since all the variables are measured relative to total assets, it is also possible to interpret the size of the coefficients. Recall that the original, undifferenced series represent the particular asset or liability as a percentage of total assets or liabilities. Thus differentiating the series causes the changes in this relationship to be measured in percentage terms.

The coefficients of the model imply that an increase in notes in circulation of one percentage point, say from twenty to twenty one percent of total assets, resulted in an increase of liquid reserves equal to 0.37 percent of total assets. Therefore, it can be maintained that the relative volume of notes in circulation had a greater effect on liquid reserves than did the relative volume of demand deposits. As expected, the banks also were forced to increase their liquid reserves more in response to an increase in demand, than in time, deposits. This difference, however, was smaller than expected.

[39] The R-square, or explanatory power, of the model is 93 percent. For a model utilizing differenced series that value is quite high, although that is not surprising given that the variables have a defined endogenous relationship among themselves. Still, it is sufficient to conclude that the model largely includes the existing trade offs between liquid reserves and other assets, as well as the effect of various liabilities on the need for liquid reserves.

The fact that an increasing share of the equity capital was held in the form of interest bearing financial assets instead of cash reserves supports the hypothesis that the increasing liquidity of the financial markets made it possible for the banks to substitute bonds and shares for more liquid assets. A one percentage point increase in the share of equity capital resulted in a 0.41 percentage point decrease in liquid reserves. In absolute numbers, however, both the level of equity capital and that of liquid reserves increased.

There is good reason to believe that interest bearing financial assets, such as bonds and bills of exchange, increasingly were substituted for liquid reserves. These assets could not totally replace liquid reserves, but the decrease in the share of liquid reserves of between 0.65 and 0.70 percentage points in response to a one percentage point increase in bonds or bills of exchange is quite striking. Also note that these bonds do not include any that might be held as part of the banks' security funds. In the next section, the hypothesis that the increased liquidity of the secondary markets for financial assets made it possible to substitute such assets for liquid reserves, will be examined further.

The lending co-efficient also indicates that the increasing demand for credit was partly accommodated by a growing public acceptance of a lower level of liquid reserves. If lending increased by one percentage point of total assets, this permitted a decrease in liquid reserves of more than half a percentage point. The variable NETBANKS simply reflects that when the banks were net creditors vis a vis other financial institutions, lower liquid reserves were needed.

Whether or not relaxing the rules for establishing new banks influenced the holding of liquid reserves remains an open question. The hypothesis was that increased public confidence in the banking system ought to have permitted a reduction in liquid reserves, and that the Banking Act of 1864 reflected such an increase in confidence. Chow breakpoint tests for the years 1864 and 1865 are significant at the ten percent significance level (see Appendix B).

A Model Estimating the Determinants of Enskilda Bank Bond Holdings

The previous section indicates that there is reason to believe that the banks experienced an increased ability to exchange interest bearing financial assets for liquid reserves. This might well have been the result of increased liquidity on the growing secondary financial market. Such a process would be consistent with a model of banks and financial markets in transitional economies created by Douglas W. Diamond. Diamond argues that the banks play an active role in creating liquid secondary markets. As capital

markets become increasingly liquid, banks can reduce their holdings of fully mature assets. That is, liquid capital markets allow banks to reduce their holdings of liquid assets, thus, in turn, further increasing capital market liquidity.[40]

The hypothesis that Sweden benefited from increasingly liquid capital markets is further supported by the increasing ability of the National Debt Office to place bonds on the domestic market. In 1861, the Office issued bonds underwritten by three actors on the Swedish credit market. In order to generate domestic demand for these bonds, they (and their interest coupons) were made acceptable for all types of tax payments. In addition, they could be transferred to third parties at no cost. In effect, these bonds had been given legal tender status, clearly indicating that the secondary financial asset market suffered from a lack of liquidity. The coupon interest rate was a reasonable 4.5%, but in addition a commission (or capital discount) of 7% had to be paid to the underwriters of the loan. In view of the problems encountered in selling the bonds outside the major cities, a further 2% commission was added for such sales. In 1865 another, supposedly temporary, loan to be administered by a Swedish bank was planned for the domestic credit market. Not only did it have to be denominated in Mark Hamburg Banko and Cologne Silver, the interest rate required was a generous 6%, with another 3.5% in total commissions.

Less than ten years later, in 1870 and 1872, two significantly larger bond loans were placed on the Swedish market. This time, no middle man was required and the interest rates were 5% and 4% respectively. In addition the commissions were lower. The second of these loans was designated to pay off the first, as well as two international bond loans dating from 1868 and 1869. Even if swings in the business cycle played some role, the domestic bond market seems to have become more liquid during these years.[41]

In this section, a model determining the variables affecting Enskilda bank holdings of bonds relative to total assets is estimated. The two hypothesis are: 1) Increasing over all liquidity made bonds a better substitute for liquid assets, and 2) If bonds are viewed as a

---

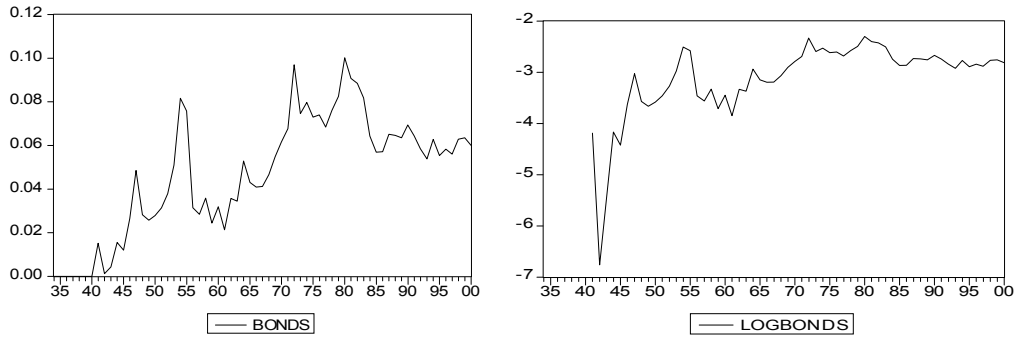
[40] Diamond, D.W. (1997) pp. 949-950. Diamond suggests that the model is particularly suitable for a developing economy, which Sweden at the time most certainly was.

[41] RGKLKT. Administering the 1861 loan were the Banking firms Carnegie o Co., C.G. Cervin and Stockholm Enskilda Bank. Administering the 1865 loan was *Skandinaviska Kreditaktiebolaget* in Gotheburg. A Professor from the Institute of Technology had to help the national Debt Office with calculating the actual cost of the loan. In the case of the 1870 and 1872 loan, commission was probably paid to local tax governors administering the handling of these bonds (see also Ögren, A. (2003b)).

substitute for liquid assets, then increased demand for credit ought to affect relative bond holdings negatively.

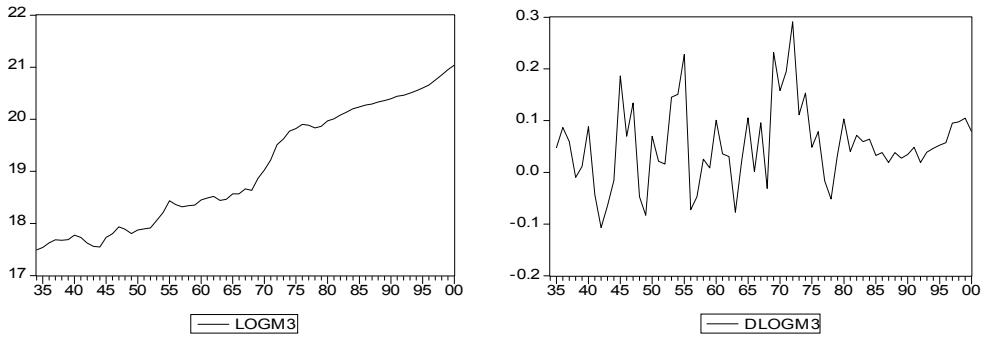
Since this model is intended to explain long term developments, the dependent variable, BONDS, is measured as the natural logarithm of bank holdings of bonds, exclusive of their security fund, in relation to total assets. As was the case with the previous model, the starting year is 1848.

Figure 18: Bond Holdings as Percent of Total Assets and in Natural Logarithm Form, 1834 – 1900



Independent variables explaining the share of bonds in total Enskilda bank holdings are: M3: The money supply in terms of M3 (circulating notes plus the public's deposits in commercial and savings banks) is used as a parameter to measure the growth of liquidity in Sweden.[42] The hypothesis is that growth in M3 ought to lead to increased Enskilda bank bond holdings. Since the natural logarithm of M3 is not stationary, it has to be implemented as first differences.

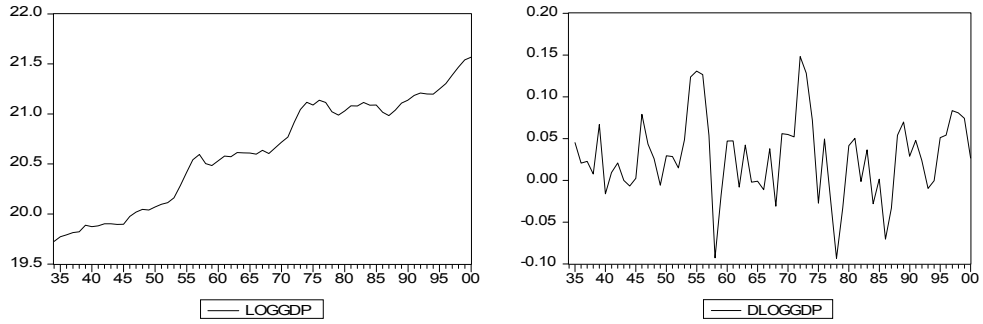
Figure 19: Money Supply M3 as a Natural Logarithm and Annual Changes Therein, 1834 – 1900



[42] Data is from Post & Inrikes Tidning 1849-1871, Sammandrag af Bankernas Uppgifter 1871-1900, SCB (1960) pp. 99, 102-103, Sveriges Riksbank (1931) pp. 45-49.

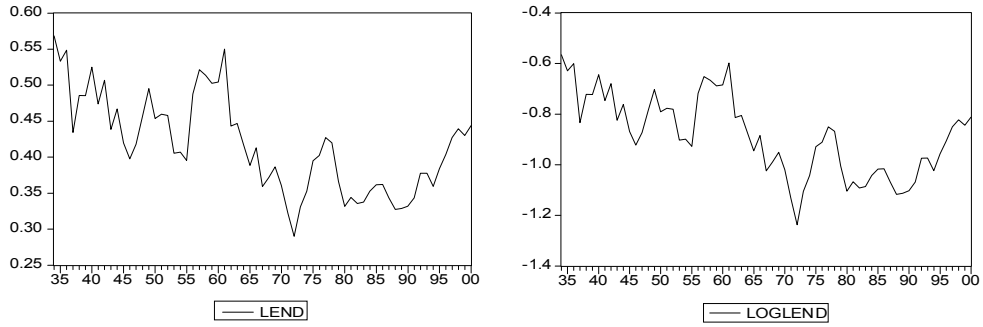
GDP: Nominal GDP is utilized as a proxy for the public's demand for credit.[43] If bonds were considered to be a substitute for liquid reserves, then increased demand for credit (as measured by GDP growth) ought to be negatively related to bond holdings. As was the case with M3, the nominal GDP series has to be differenced to become stationary.

Figure 20: Nominal GDP as a Natural Logarithm and Annual Changes Therein, 1834 – 1900



LEND: If bonds were considered to be a substitute for liquid reserves, then Enskilda bank lending relative to total assets ought to negatively related to bond holdings. According to the ADF-test, the lending series is actually more stationary in its original, than in its logarithmic, form. Thus the series LEND is defined simply as lending as a share of total assets, even though this series is only close to being stationary at the 5% significance level (see Appendix C).

Figure 21: Enskilda Bank Lending as Percentage of Total Assets and as a Natural Logarithm, 1834 – 1900



[43] The series of GDP at current prices has been gathered from Krantz, O. (1997) pp. 12-14. One possible complication is that the growth of GDP might have been impeded by a lack of credit. Thus GDP would reflect the lack of supply of, as well as the level of demand for, credit. Even though the supply of commercial bank credit initially only equaled one half percent of GDP, rising to over 40 percent in 1913, however, the relationship in absolute numbers between GDP at current prices and the supply of credit is close to linear (the correlation coefficient is 0.94, significant at the 1% level). Krantz, O. (1997) pp. 12-14, Sveriges Riksbank (1931) pp. 172-185.

Finally, Enskilda bank holdings of bonds lagged one year was included in the model. It was expected that bond holdings would be positively related to bond holdings lagged one year, since the ability to substitute bonds for liquid reserves was increasing over time.

As was the case with the previous model, one question concerns the existence of a structural break point either in 1864 or in 1865. Dealing with Swedish monetization indicates that there was a structural break in the late 1860's which ought to have increased the ability to substitute bonds for liquid reserves.[44]

Estimating the Model Determining Enskilda Bank Bond Holdings

An OLS-regression on the model for the years 1848 through 1900, gave the results presented in figure 3.22 (for tests of the model, see Appendix C).

Figure 22: OLS-Regression Results of the Determinants of Enskilda Bank Bond Holdings

Dependent Variable: LOG(BONDS)				
Sample: 1848 1900				
Included observations: 53				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.489785	0.203332	-2.408797	0.0199
DLOG(M3)	1.388260	0.402205	3.451620	0.0012*
DLOG(GDP)	-1.064474	0.541654	-1.965229	0.0552(*)
LEND	-2.166584	0.595783	-3.636532	0.0007*
LOG(BONDS(-1))	0.552661	0.085126	6.492282	0.0000*
R-squared	0.828695	Mean dependent var		-2.929539
Adjusted R-squared	0.814420	S.D. dependent var		0.391197
Log likelihood	21.79811	F-statistic		58.05068
Durbin-Watson stat	1.737505	Prob(F-statistic)		0.000000

* Denotes at least 5% significance level, (*) is close

Sources: Krantz, O. (1997) pp. 12-14, Post & Inrikes Tidning 1849 – 1871, Sammandrag af Bankernas Uppgifter, 1871-1900, SCB (1960) pp. 99, 102-103, Sveriges Riksbank (1931) pp. 172-185

The results of estimating the model seem to be consistent both with the hypothesis that interest bearing bonds increasingly become a reliable substitute for liquid reserves and the hypothesis that this was a consequence of the increased liquidity of the secondary financial markets.[45]

[44] See also Ögren, A. (2003c)

[45] The R-square, or explanatory power, is 83 percent. While not high for time series analysis, it is clearly sufficient to conclude that the model captures the determinants of Enskilda bank bond holdings quite well.

Increases in domestic liquidity, as measured by the growth of M3, resulted in larger bond holdings. Since the growth of economy wide liquidity facilitated the conversion of bonds into liquid assets, this result is in accord with the hypothesis. Since both the dependent and the independent variable are natural logarithms, it is also possible to evaluate the size of the coefficients. A one percent change in economy wide liquidity resulted in a 1.38 percentage point increase in the share of bonds in total bank assets.

Increases in both lending and the demand for credit, the latter represented by annual changes in nominal GDP, resulted in decreased Enskilda bank bond holdings (although the GDP relationship was not significant at the 5% level). These results tend to support the hypothesis that bonds were held as substitutes for liquid reserves since both strictly cash reserves and bond holdings decreased when the demand for credit increased.

The percentage of bonds in total bank assets was positively related to bonds held the previous year. This is likely to be the result of an increasing ability over time to substitute interest bearing bonds for liquid reserves, as the liquidity of secondary asset markets improved. A discontinuity in the ability to hold financial assets in place of cash reserves indicates that the secondary markets for such assets had become sufficiently liquid to assure the holder that they could be sold with little risk of substantial loss. One way to test if and when such a break occurred is to apply the Chow breakpoint test on the model.

Figure 23: Chow Breakpoint tests of the model for the years 1864 & 1865

Chow Breakpoint Test: 1864			
F-statistic	4.085446	Probability	0.004015*
Log likelihood ratio	20.60074	Probability	0.000963
Chow Breakpoint Test: 1865			
F-statistic	5.037635	Probability	0.001014*
Log likelihood ratio	24.43676	Probability	0.000179

* Denotes at least 5% significance level

The Chow breakpoint tests for the years 1864 and 1865 also are significant at the 5% significance level, indicating that a structural change in the ability hold bonds probably occurred during these years. The high level of significance for year 1865, when the establishment of new banks accelerated in response to the Banking Act of 1864, supports the hypothesis that the right to freely open new banks facilitated the development of the Swedish credit market. Thus the 1860's, thanks to the evolution of the banking system, witnessed significant progress in the creation of the prerequisites needed for the development of an efficient over all capital market.

Conclusions

To paraphrase Mark Twain; the rumors concerning the death of the Enskilda banks in response to the introduction of joint stock banking during the 1860's are exaggerated. The Enskilda banks continued to dominate Swedish banking until the dawn of the twentieth century. Given the commercial banking system's undoubted contribution to economic growth, the Enskilda banks might well have been an optimum response, given the state of the economy and the existing institutional setting. The aspect of the Enskilda banks used to brand them as backward, the issuance of notes, in fact was the source of their success.

The ability to issue notes gave the Enskilda banks a degree of flexibility that made it possible for them to operate in areas of capital scarcity. The use of deposit financing developed not so much because of the repeal of the usury law in 1863, but because of the provision of sufficient means of payment. The circulation of money, usable for deposits, was largely a result of the note issuance activities of the Enskilda banks.

As deposits increasingly become a viable alternative means of financing banking activity, the Enskilda banks came largely to rely on them. By the late 1860's, note issuance had become secondary to deposits. Indeed, throughout the nineteenth century, the Enskilda banks held more deposits than did the joint stock banks. One of the advantages of the Enskilda banks versus their joint stock competitors was their greater ability to liquify fixed assets, even when they lacked sufficient deposits to operate their business. Arguably, this advantage was maintained throughout the nineteenth century and made the Enskilda banks' mode of operation superior in most parts of Sweden.

The latter section in this chapter examined the interaction between the Enskilda banks and the emergence of liquid capital markets. The level of liquid reserves maintained by the Enskilda banks declined rapidly during the period 1834-1900. Three explanatory hypotheses were discussed: 1) Increasing confidence in the banking system resulted in a decreased demand for liquid reserves, 2) Increasing demand for credit by the public resulted in a decreased demand for liquid reserves and 3) Increasing liquidity of capital markets allowed the Enskilda banks to substitute income generating assets, such as bonds and shares, for non-interest bearing cash reserves.

All three hypotheses seem to have some validity, even if the confidence effect is difficult to measure. Liquid reserves definitely decreased as demand for credit rose, and bond holdings were strongly negatively related to totally liquid reserves. As Enskilda bank bond holding increased in tandem with the economy's overall liquidity, growing

capital markets made it possible to substitute interest bearing assets for liquid reserves. Thus, as the liquidity of capital markets increased as a result of banking activities, the banks needed less liquid reserves, thereby further increasing the liquidity of the markets.

The years 1864 and 1865 witnessed a leap upward in the bond holdings of the Enskilda banks, implying a breakthrough for Swedish capital markets. The conclusion of this paper is that the Banking Act of 1864, by removing virtually all legal barriers to the establishment of new banks, was of greater importance for the development and integration of the Swedish credit market than was the introduction of limited liability Joint Stock banking.

Sources and literature

Sources

Riksdagstryck [Parliamentary Publication]

BaU – Bankoutskottet 6:e Samlingen 1853/54 [Standing Committee on Banking]

Sources at the National Archive of Sweden

Finanskommittén 1858 – ÄK No 496 Vol. 1 – 4 [Temporary Committee on Finance 1858]

RGKLKT – Riksgäldskontoret Lånekontrakt Tryckta 1858 – 1872. RGK No 9060 [National Debt Office Borrowing Contracts, Printed]

Other sources

Krantz, O. (1997), "Swedish Historical National Accounts 1800-1990 – aggregate output series." Mimeo. Department of Economic History. Umeå University, Sweden.

Motormännens Riksförbund (1999) Motormännens Sverige Atlas. [Swedish Road Map] Kartförlaget, KartCentrum. Vällingby, Sweden.

Post & Inrikes Tidning [Official Swedish Gazette]: March 21, April 29 1835. March 9, April 26 1836. March 29, May 24 1837. March 21, 23 1838. February 12, July 7 1840. February 24 1841. February 24 1842. February 2, April 24, 26 1843. February 5 1844. February 17 1845. February 25 1846. February 5 1847. February 9 1848. February 19, 21, 22, 23 1849. February 20, 21, 25, 28 1850. March 15, 17, 19, 20 1851. February 23, 25, March 1, 4 1852. February 5, 9, 12, 14 1853. March 16, 23, 30 1854. February 7, 8, 10, 13 1855. February 16, 21, 22, 25 1856. February 26, March 5, 10, 12 1857. February 18, 23, 25, 26, March 6, 9 1858. February 23, 24, 26, March 2, 3, 4 1859. February 24, 25, 29, March 1, 2, 8 1860. March 1, 8, 11, 13, 15, 18 1861. February 10, 12, 14, 17, 19, 21 1862. March 17 1863. February 12 1864. March 3 1865. March 2, November 12 1866. January 16, February 20, March 15, 22, April 12, 16, 20,

26, May 2, 9, September 13, October 30 1867. August 11 1868. February 18 1869. February 21 1870. February 21 1871.

Sammandrag af Bankernas Uppgifter [Summary of Bank Reports]: 1871-1877, 1878-1880, 1881-1883, 1884-1886, 1887-1889, 1890-1892, 1893-1895, 1896-1898, 1899-1901, 1902-1904, 1905-1907, 1908-1910, 1911.

SCB (1960), *Historisk statistik för Sverige. Part III. Statistiska översiktstabeller.* [Historical Statistics of Sweden III. Statistical Surveys- National Bureau of Statistics] SCB. Stockholm, Sweden.

SFS [Swedish Code of Statues]: 1846:1, 1864:31, 1874:44

Sveriges Riksbank (1931), ”Statistiska tabeller” [Statistical tables] in *Sveriges Riksbank 1668-1924. Bankens tillkomst och verksamhet. Part V*. Norstedts. Stockholm, Sweden.

Literature

Brisman, S. (1924) *Sveriges Affärsbanker. Grundläggningstiden.* Svenska Bankföreningen. Norstedts. Stockholm, Sweden.

Brisman, S. (1931) “Den stora reformperioden 1860-1904” *in Sveriges Riksbank 1668-1924-1931. Bankens tillkomst och verksamhet, part IV*. Sveriges Riksbank. Norstedts. Stockholm, Sweden.

Brisman, S. (1934) *Sveriges affärsbanker. Utvecklingstiden.* Svenska bankföreningen. Norstedts. Stockholm, Sweden.

Diamond, D. W. (1997) “Liquidity, Banks, and Markets.” Journal of Political Economy **105**, pp. 928-956

Diamond, D. W. & Dybvig, P.H. (1983) “Bank Runs, Deposit Insurance, and Liquidity.” Journal of Political Economy **91**, pp. 401-419

Diamond, D. W. & Rajan, R.G. (2001) “Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking.” Journal of Political Economy **109**, pp. 287-327.

Fisher, D. & Thurman, W. N. (1989) “Sweden’s Financial Sophistication in the Nineteenth Century: An Appraisal.” Journal of Economic History **49**, pp. 621-634

Flux, A.W. (1910) *The Swedish Banking System.* National Monetary Commission. Washington, USA.

Gasslander, O. (1962) *History of Stockholms Enskilda Bank to 1914.* Esselte. Stockholm, Sweden.

Hansson, P. & Jonung, L. (2000) *Det finansiella systemet och den ekonomiska tillväxten: Svenska erfarenheter 1834-1991.* SOU 2000:11. Sweden.

Jonung, L. (1989) “The Economics of Private Money. Private Bank Notes in Sweden 1831-1902.” Research Report. Stockholm School of Economics, Sweden.

Kindleberger, C. P. (1982) “Sweden in 1850 as an ”Impoverished Sophisticate”: Comment.” Journal of Economic History **42**, pp. 918-920

Lobell, H. (2000) *Växelkurspolitik och marknadsintegration. De utländska växelkurserna i Sverige 1834-1880.* Lund Studies in Economic History 14. Almqvist & Wicksell International. Södertälje, Sweden.

Nilsson, G. B. (1981) *Banker i brytningstid. AO Wallenberg i svensk bankpolitik 1850-1856.* EHF, Liber. Stockholm, Sweden.

Sandberg, L. G. (1978) "Banking and Economic Growth in Sweden before World War I." Journal of Economic History **38**, pp. 650-680

Sandberg, L. G. (1979) "The Case of the Impoverished Sophisticate: Human Capital and Swedish Economic Growth before World War I." Journal of Economic History **39**, pp. 225-241

Sandberg, L. G. (1982) "Sweden as an "Impoverished Sophisticate": A Reply." Journal of Economic History **42**, pp. 921-922

Selgin, G. A. & White, L. H. (1994) "How Would the Invisible Hand Handle Money?" Journal of Economic Literature **32**, pp. 1718-1749

Sjölander, A. (2000) *Att reglera eller inte reglera – En undersökning av Sparbanksfrågan i Riksdagen 1882 – 1939.* Uppsala Papers in Financial History No 13. Uppsala University, Sweden.

Sylla, R. (2002) "Financial Systems and Economic Modernization." Journal of Economic History **62**, pp. 277-292

Söderlund, E. (1964) *Skandinaviska banken 1864 – 1914.* Esselte. Stockholm, Sweden.

Ögren, A. (2000) *Expansion of the Money Supply, Competitive Note Issuance and the International Adjustment Mechanism: Sweden under the Silver and the Gold Standard, 1834 – 1913.* Licentiate thesis. Stockholm School of Economics, Sweden.

Ögren, A. (2003a) *Empirical Studies in Money, Credit and Banking: The Swedish Credit Market in Transition under the Silver and Gold Standards, 1834 – 1913.* Doctoral thesis. Stockholm School of Economics, Sweden.

Ögren, A. (2003b) "Lender of Last Resort in a Transitional Economy with a Fixed Exchange Rate: Financial Crises and Monetary Policy in Sweden under the Silver and Gold Standards, 1834 – 1913" SSE/EFI Working Paper in Economics and Finance No 537.

Ögren, A. (2003c) "Expansion of the Money Supply with a Fixed Exchange Rate: "Free Banking" in Sweden under the Silver and Gold Standards, 1834 – 1913" SSE/EFI Working Paper in Economics and Finance No 541.

Appendix – Testing the Models

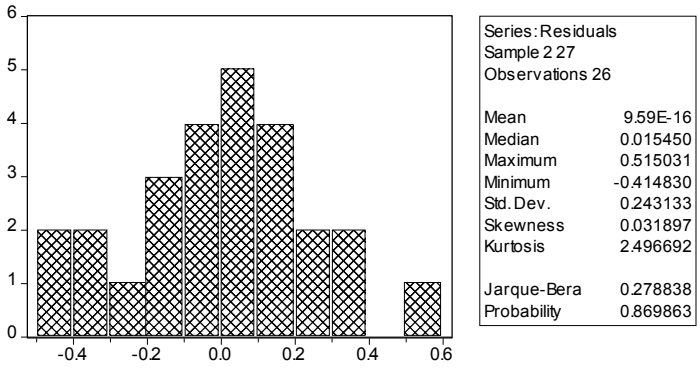
Appendix A – Testing the OLS-Regression determining the use of Deposits (Cross Sectional)

Since this model is cross sectional all banks have been sorted in an alphabetic order. Thus, the series are assumed to be stationary (and are so when tested with the ADF-test).

Appendix Figure 1: Complete readout from the Cross Sectional OLS Regression

Dependent Variable: LOG(DEPOSITS)				
Method: Least Squares				
Sample(adjusted): 2 27				
Included observations: 26 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.443573	0.990213	1.457841	0.1584
LOG(STHLM+GBG)	-0.387038	0.156215	-2.477599	0.0210
EST60	-0.064223	0.104264	-0.615966	0.5440
R-squared	0.260449	Mean dependent var		-1.078272
Adjusted R-squared	0.196140	S.D. dependent var		0.282722
S.E. of regression	0.253483	Akaike info criterion		0.201129
Sum squared resid	1.477837	Schwarz criterion		0.346294
Log likelihood	0.385317	F-statistic		4.049968
Durbin-Watson stat	1.578089	Prob(F-statistic)		0.031127

Appendix Figure 2: Distribution of Residuals, Histogram Normality Test on the Cross Sectional OLS Regression



As seen in the figure above, the residuals are normally distributed, and this allows for further testing of the model.

Appendix Figure 3: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.381390	Probability	0.687546
Obs*R-squared	0.911294	Probability	0.634038

As seen above, the model goes clear from the problem of serial correlation, and as the model is made using cross sectional data (no time series) this is expected.

Appendix Figure 4: White Heteroskedasticity Test (Including Cross Terms)

F-statistic	0.674197	Probability	0.617285
Obs*R-squared	2.958902	Probability	0.564726

Heteroskedasticity (a systematic pattern of volatility in values) is seldom a problem using cross sectional data. And this test shows that this was not a problem for the model.

Appendix Figure 5: Ramsey RESET Test (general stability and specification test)

F-statistic	0.059878	Probability	0.808957
Log likelihood ratio	0.070669	Probability	0.790365

Appendix B – testing the OLS model determining liquidity reserves (time series)

Appendix Figure 6: Complete readout from the Time Series OLS Regression Determining Liquidity Reserves

Dependent Variable: D(LIQRES)				
Method: Least Squares				
Sample: 1848 1900				
Included observations: 53				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000329	0.001197	-0.274696	0.7848
D(NOTES)	0.374589	0.054964	6.815180	0.0000
D(DDEP)	0.233642	0.115118	2.029597	0.0485
D(TDEP)	0.186586	0.070322	2.653305	0.0110
D(EQCAP)	-0.411678	0.067226	-6.123787	0.0000
D(NETBANKS)	-0.354857	0.059962	-5.917981	0.0000
D(BONDS)	-0.654004	0.144980	-4.511005	0.0000
D(BOE)	-0.703533	0.083705	-8.404890	0.0000
D(LEND)	-0.569022	0.065145	-8.734735	0.0000
R-squared	0.929814	Mean dependent var		-0.004021
Adjusted R-squared	0.917052	S.D. dependent var		0.026099
S.E. of regression	0.007517	Akaike info criterion		-6.789900
Sum squared resid	0.002486	Schwarz criterion		-6.455322
Log likelihood	188.9324	F-statistic		72.86266
Durbin-Watson stat	2.076707	Prob(F-statistic)		0.000000

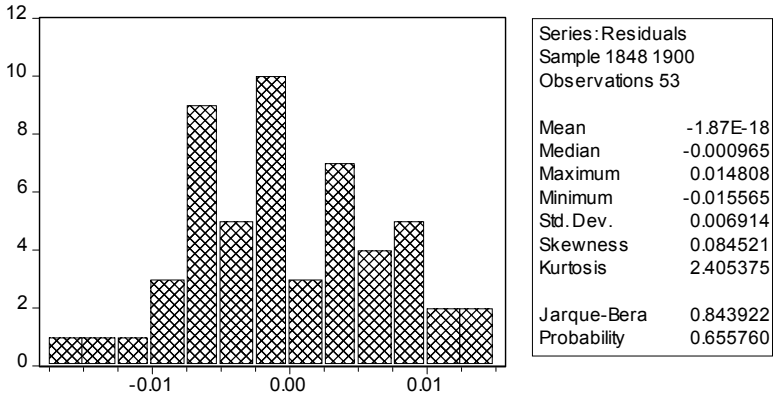
All series, except for NETBANKS, are un-stationary when not differenced. The series NETBANKS is stationary at a 5 percent significance level, and hence can be implemented in the model as it is. But, as all other variables are set as annual changes in

relation to total assets or liabilities, this is also chosen for this variable so that it can be interpretated in the same manner as all other independent variables.

Appendix Figure 7: ADF-test NETBANKS, intercept and no lags

ADF Test Statistic	-3.113860	1% Critical Value*	-3.5312
		5% Critical Value	-2.9055
		10% Critical Value	-2.5899

Appendix Figure 8: Distribution of Residuals, Histogram Normality Test on the Time Series OLS Regression Determining Liquidity Reserves



Appendix Figure 9: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.139145	Probability	0.710965
Obs*R-squared	0.170951	Probability	0.679268

As seen above, the model goes clear from the problem of serial correlation, and as the first differentiate of all variables are used this is expected. A change in the dependent variable LIQRES, should not be dependent on changes in this variable in the foregoing year.

Appendix Figure 10: White Heteroskedasticity Test (including cross-terms)

F-statistic	1.437783	Probability	0.306590
Obs*R-squared	47.05016	Probability	0.348761

It was earlier mentioned that heteroskedasticity was an expected problem of the model. And to some extent it probably was. The test, however, indicates that it is not corrupting the model, perhaps a result of the fact that the model starts in 1848.

Appendix Figure 11: Ramsey RESET Test (general stability and specification test)

F-statistic	1.570622	Probability	0.216889
Log likelihood ratio	1.901366	Probability	0.167926

The Ramsey RESET test shows that even though the p-value is not that high, it is sufficient to exclude the problems of missing variables, model specification and serial correlation.

Appendix Figure 12:Testing for multicolinearity (Correlations between independent variables)

	DBOE	DBONDS	DDDEP	DEQ CAP	DLEND	DNOTES	DTDEP	DNET BANKS
DBOE	1.00	0.09	-0.08	-0.09	-0.34	0.00	0.39	-0.05
DBONDS	0.09	1.00	0.38	-0.41	-0.49	0.22	-0.05	0.19
DDDEP	-0.08	0.38	1.00	-0.26	-0.16	0.08	-0.21	0.06
DEQCAP	-0.09	-0.41	-0.26	1.00	-0.03	-0.53	-0.10	0.19
DLEND	-0.34	-0.49	-0.16	-0.03	1.00	-0.13	0.06	-0.54
DNOTES	0.00	0.22	0.08	-0.53	-0.13	1.00	-0.23	0.12
DTDEP	0.39	-0.05	-0.21	-0.10	0.06	-0.23	1.00	-0.01
DNETBANKS	-0.05	0.19	0.06	0.19	-0.54	0.12	-0.01	1.00

One problem that could be experienced, especially as all variables already are interlinked through the definition of balance sheets, are that the independent variables could be suffering from mulitcolinearity. When viewing the correlation between annual changes in the independent variables, multicolinearity was not detected.

Appendix Figure 13: Chow Breakpoint tests of the model for the years 1864 & 1865

Chow Breakpoint Test: 1864			
F-statistic	1.961591	Probability	0.074773
Log likelihood ratio	21.64521	Probability	0.010074
Chow Breakpoint Test: 1865			
F-statistic	1.904044	Probability	0.083952
Log likelihood ratio	21.12131	Probability	0.012123

Appendix Figure 14: Complete readout from the Time Series OLS Regression Determining Liquidity Reserves with Liabilities only

Dependent Variable: D(LIQRES)				
Method: Least Squares				
Sample: 1848 1900				
Included observations: 53				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002252	0.002028	-1.110731	0.2722
D(NOTES)	0.729477	0.061884	11.78789	0.0000
D(DDEP)	0.686631	0.166980	4.112049	0.0002
D(TDEP)	0.249116	0.097206	2.562764	0.0136
D(LBANKS)	0.479656	0.111262	4.311054	0.0001
R-squared	0.768498	Mean dependent var		-0.004021
Adjusted R-squared	0.749206	S.D. dependent var		0.026099
S.E. of regression	0.013070	Akaike info criterion		-5.747410
Sum squared resid	0.008200	Schwarz criterion		-5.561533
Log likelihood	157.3064	F-statistic		39.83535
Durbin-Watson stat	2.279469	Prob(F-statistic)		0.000000

The OLS-regression above shows that the model original model (figure 17) was not corrupted by the inclusion of assets in the model (even though these are defined in relation to the dependent variable, liquid reserves).

Appendix C – testing the OLS model determining Bond holdings (time series)

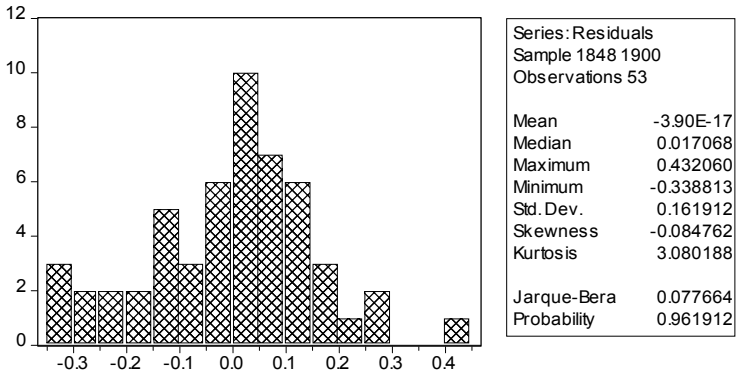
Appendix Figure 15: Complete readout from the Time Series OLS Regression Determining Bond Holdings

Dependent Variable: LOG(BONDS)				
Method: Least Squares				
Sample: 1848 1900				
Included observations: 53				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.489785	0.203332	-2.408797	0.0199
DLOG(M3)	1.388260	0.402205	3.451620	0.0012
DLOG(GDP)	-1.064474	0.541654	-1.965229	0.0552
LEND	-2.166584	0.595783	-3.636532	0.0007
LOG(BONDS(-1))	0.552661	0.085126	6.492282	0.0000
R-squared	0.828695	Mean dependent var		-2.929539
Adjusted R-squared	0.814420	S.D. dependent var		0.391197
S.E. of regression	0.168524	Akaike info criterion		-0.633891
Sum squared resid	1.363213	Schwarz criterion		-0.448014
Log likelihood	21.79811	F-statistic		58.05068
Durbin-Watson stat	1.737505	Prob(F-statistic)		0.000000

Appendix Figure 16: ADF-test for stationarity of series Log(BONDS) & LEND

ADF Test Statistic	-6.657701	1% Critical Value*	-3.5457
For series LOG(BONDS)		5% Critical Value	-2.9118
		10% Critical Value	-2.5932
ADF Test Statistic	-2.898698	1% Critical Value*	-3.5312
For series LEND		5% Critical Value	-2.9055
		10% Critical Value	-2.5899

Appendix Figure 17: Distribution of Residuals, Histogram Normality Test on the Time Series OLS Regression Determining Bond Holdings



Appendix Figure 18: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.585383	Probability	0.448035
Obs*R-squared	0.651992	Probability	0.419401

Appendix Figure 19: : White Heteroskedasticity Test (including cross-terms)

F-statistic	1.261033	Probability	0.288173
Obs*R-squared	9.885290	Probability	0.273170

Appendix Figure 20: Ramsey RESET Test (general stability and specification test)

F-statistic	0.132356	Probability	0.717633
Log likelihood ratio	0.149043	Probability	0.699452

Appendix Figure 21: Testing for multicolinearity (Correlations between independent variables)

	DLOGM3	DLOGGDP	LEND	LOGBONDLAG
DLOGM3	1.000000	0.484658	-0.457045	0.283169
DLOGGDP	0.484658	1.000000	-0.152426	0.176362
LEND	-0.457045	-0.152426	1.000000	-0.489657
LOGBONDLAG	0.283169	0.176362	-0.489657	1.000000

Appendix Figure 22: Chow Breakpoint tests of the model for the years 1864 & 1865

Chow Breakpoint Test: 1864			
F-statistic	4.085446	Probability	0.004015
Log likelihood ratio	20.60074	Probability	0.000963
Chow Breakpoint Test: 1865			
F-statistic	5.037635	Probability	0.001014
Log likelihood ratio	24.43676	Probability	0.000179